IN THE CLAIMS

In this amendment, claims 1-31 and 75-100 are pending. Claims 1, 5, 10, 13, 14, 16, 24, 27, 29, 87 and 89 are amended. Claim 31 is canceled. Claim 101 is added. The status of all claims is provided below.

1. (currently amended) A process of making a device for conducting a unit operation comprising:

stacking a plurality of shims such that a plurality of continuous flow paths are formed through the shims;

wherein the flow paths extend in a direction substantially parallel to shim thickness;

wherein the plurality of continuous flow paths are connected to a common header;

wherein the term "substantially parallel to shim thickness" means substantially perpendicular to shim width and permits some curvature or minor, or partial deviation from 90° with respect to shim width, and furthermore, a flow path that travels perpendicular ~~parallel~~ to shim thickness over the surface of a shim, through an opening in an adjacent shim, and down to the surface of another shim and again runs perpendicular ~~parallel~~ to shim thickness is not "substantially parallel to shim thickness";

wherein the plurality of shims comprises at least three adjacent shims through which the flow paths are formed and wherein a straight, unobstructed line is present through at least one of the flow paths ~~path~~ in said at least three shims;

wherein the at least one flow path in which there is a straight, unobstructed line in said at least 3 shims is defined by borders of apertures in said at least 3 shims, and wherein, in each of said borders of apertures in said at least 3 shims defining a flow path, wherein each of said borders has a circumference and wherein said circumference in each shim is at least 20% populated by edge features;

wherein the three shims are configured such that a unit operation can be performed on a fluid in the flow path in which the straight, unobstructed line is present in said at least three

adjacent shims; and

bonding the shims to form the device capable of performing the unit operation on a fluid.

2. (previously presented) The process of claim 1 wherein the at least one flow path is formed by an aperture in each of the at least three adjacent shims and wherein the aperture in each of the at least three adjacent shims comprises a shape selected from the group consisting of: circles, triangles, waves, ovals, irregular shapes and rectangles or squares or triangles with rounded corners.

3. (previously presented) The process of claim 2 wherein the aperture in each of the at least three adjacent shims comprises a shape selected from the group consisting of: circles and triangles; and

wherein the at least three shims are bonded to form the device wherein the device comprises a flow path having a cylindrical or prismatic shape.

4. (original) The process of claim 1 wherein each of the at least 3 adjacent shims is identical.

5. (currently amended) A process of making a device for conducting a unit operation comprising:

stacking a plurality of shims such that a continuous first flow path and a continuous second flow path are formed through the shims;

wherein the first and second flow paths are substantially parallel to shim thickness;

wherein the term "substantially parallel to shim thickness" means substantially perpendicular to shim width and permits some curvature or minor, or partial deviation from 90° with respect to shim width, and furthermore, a flow path that travels perpendicular ~~parallel~~ to shim thickness over the surface of a shim, through an opening in an adjacent shim, and down to the surface of another shim and again runs perpendicular ~~parallel~~ to shim thickness is not

"substantially parallel to shim thickness";

wherein the plurality of shims comprises at least three adjacent shims through which the first flow path is formed and wherein a straight, unobstructed line is present through the first flow path in said at least three shims;

wherein the three shims are configured such that a unit operation can be performed on a fluid in the first flow path in which the straight, unobstructed line is present in said at least three adjacent shims; and

bonding the shims to form the device capable of performing the unit operation on a fluid; and

further comprising the steps of placing a first catalyst or sorbent in said first flow path and placing a second catalyst in the second flow path;

wherein the second catalyst is different than the first catalyst or sorbent.

6. (previously presented) The process of claim 1 wherein the first flow path in said at least three shims does not connect with any other flow paths.

7. (previously presented) The process of claim 6 further comprising the step of placing a static mixer in said first flow path.

8. (original) A device formed by the method of claim 1.

9. (Previously presented) A process of conducting the unit operation comprising the step of passing a fluid through the flow path formed in said at least three adjacent shims of the device of claim 8 and conducting the unit operation on the fluid in the flow path formed in said at least three adjacent shims.

10. (currently amended) A process, comprising:

stacking a plurality of shims such that a continuous first flow path and a continuous

second flow path and a continuous third flow path are formed through the shims;

wherein the first and second and third flow paths are substantially parallel to shim thickness;

wherein the term "substantially parallel to shim thickness" means substantially perpendicular to shim width and permits some curvature or minor, or partial deviation from 90° with respect to shim width, and furthermore, a flow path that travels perpendicular ~~parallel~~ to shim thickness over the surface of a shim, through an opening in an adjacent shim, and down to the surface of another shim and again runs perpendicular ~~parallel~~ to shim thickness is not "substantially parallel to shim thickness";

wherein the plurality of shims comprises at least three shims through which the first flow path and second flow path and third flow path are formed and wherein a straight, unobstructed line is present through the first flow path in said at least three shims, and wherein a straight, unobstructed line is present through the second flow path in said at least three shims;

wherein the first flow path in said at least three shims does not mix with any other flow paths; and

wherein the second ~~first~~ flow path in said at least three shims does not mix with any other flow paths;

bonding the shims to form a device capable of performing a unit operation on a fluid;

passing a first fluid into the device such that the fluid passes through the first flow path and the third flow path in said plurality of shims; and

performing at least one first unit operation on the fluid as it passes through the first flow path in which a straight, unobstructed line is present in said at least three shims;

performing at least one first unit operation on the fluid as it passes through the third flow path in said at least three shims;

wherein the first unit operation is selected from the group consisting of distilling, reacting, adsorbing, compressing, expanding, separating, absorbing, vaporizing, condensing, and combinations of these;

passing a second fluid into the device such that the fluid passes through the second flow

path in said plurality of shims; and

performing at least one second unit operation on the fluid as it passes through the second flow path in which a straight, unobstructed line is present in said at least three shims;

wherein the second unit operation is selected from the group consisting of distilling, reacting, adsorbing, compressing, heating, cooling, expanding, separating, absorbing, vaporizing, condensing, and combinations of these;

wherein the first flow path, second flow path, and third flow path are each in alternating parallel rows wherein the second flow path is disposed between the first and third flow paths;

wherein heat is exchanged between the first and second flow paths and heat is exchanged between the third and second flow paths; and

wherein the first and second unit operations are different.

11. (Previously presented) The process of claim 10 wherein the first flow path formed in said at least 3 shims is defined by borders of apertures in said at least 3 shims, and wherein, in each of said at least 3 shims there is a border of said borders of apertures in said at least 3 shims defining the first flow path, the border having a circumference and wherein said circumference in each shim is at least 20% populated by edge features.

12. (Previously presented) The process of claim 10 wherein the first flow path formed in said at least 3 shims is defined by the borders of apertures in said at least 3 shims, and wherein, in at least one of said at least 3 shims there is a border of said borders of apertures in said at least 3 shims defining ~~a~~ the flow path, the border having a circumference and wherein said circumference in each shim is at least 20% populated by edge features, and wherein in another of said at least 3 shims there is a border defining the flow path, and the border in said another of said at least 3 shims is smooth.

13. (currently amended) A process, comprising:

stacking a plurality of shims such that a continuous flow path is formed through the

shims;

wherein the flow path is substantially parallel to shim thickness;

wherein the term "substantially parallel to shim thickness" means substantially perpendicular to shim width and permits some curvature or minor, or partial deviation from 90° with respect to shim width, and furthermore, a flow path that travels perpendicular ~~parallel~~ to shim thickness over the surface of a shim, through an opening in an adjacent shim, and down to the surface of another shim and again runs perpendicular ~~parallel~~ to shim thickness is not "substantially parallel to shim thickness";

wherein the plurality of shims comprises at least three shims through which the flow path is formed and a straight, unobstructed line is present through the flow path in said at least three shims;

bonding the shims to form a device capable of performing a unit operation on a fluid;

passing the fluid into the device such that the fluid passes through the flow path in said at least three shims; and

performing the unit operation on the fluid as it passes through the flow path in which the straight, unobstructed line is present in said at least three shims;

wherein the unit operation is selected from the group consisting of distilling, ~~adsorbing, compressing, expanding,~~ and separating~~, absorbing, vaporizing, condensing, and combinations of these~~.

14. (currently amended) The process of claim 13 wherein the ~~device is capable of performing at least one~~ unit operation ~~selected from the group consisting of: chemical separation and~~ comprises distillation.

15. (Previously presented) The process of claim 13 wherein the flow path in said at least three shims does not connect with any other flow paths.

16. (currently amended) The process of claim 13 further comprising a second fluid that passes through a second flow path in said at least three shims;

wherein the second flow path is substantially parallel to shim thickness.

17. (original) The process of claim 16 wherein the fluid in said flow path and the second fluid in said second flow path do not mix.

18. (original) The process of claim 17 wherein the fluid in said flow path and the second fluid in said second flow path in said at least three shims are separated by a distance of 5 mm or less and wherein the pressure in said flow path and the second flow path differ by at least 1 atm.

19. (previously presented) The process of claim 18 wherein the flow path has rounded edges and wherein the pressure in said flow path and the second flow path differ by at least 10 atm.

20. (original) The process of claim 18 wherein the fluid in said flow path and the second fluid in said second flow path in said at least three shims are separated by a distance of 1 mm or less and wherein the pressure in said flow path and the second flow path differ by at least 19 atm.

21. (original) The process of claim 17 wherein the fluid in the second flow path is a heat exchange fluid.

22. (original) The process of claim 18 wherein the flow path comprises first supports that extend across the flow path, and the second flow path comprises second supports that extend across the second flow path; and

wherein the first supports and the second supports are staggered.

23. (previously presented) The process of claim 17 wherein the second fluid comprises a reaction composition;

wherein the reaction composition reacts exothermically.

24. (currently amended) A process, comprising:

stacking a plurality of shims such that a continuous microchannel flow path is formed through the shims;

wherein the microchannel flow path is substantially parallel to shim thickness;

wherein the term "substantially parallel to shim thickness" means substantially perpendicular to shim width and permits some curvature or minor, or partial deviation from 90° with respect to shim width, and furthermore, a flow path that travels perpendicular ~~parallel~~ to shim thickness over the surface of a shim, through an opening in an adjacent shim, and down to the surface of another shim and again runs perpendicular ~~parallel~~ to shim thickness is not "substantially parallel to shim thickness";

wherein the plurality of shims comprises at least three shims through which the microchannel flow path is formed and wherein the microchannel flow path in said at least three shims has a minimum dimension (height or width) of at least 10 μm;

bonding the shims to form a device capable of performing a unit operation on a fluid;

passing the fluid into the device such that the fluid passes through the microchannel flow path in said at least three shims; and

performing the unit operation on the fluid as it passes through the microchannel flow path in which the straight, unobstructed line is present in said at least three shims.

25. (previously presented) The process of claim 24 wherein the unit operation is selected from the group consisting of: chemical reaction, vaporization, compression, chemical separation, distillation, and condensation.

26. (previously presented) The process of claim 24 wherein the flow path has a maximum dimension (height or width) of at most 1000 μm.

27. (currently amended) A process, comprising:

stacking a plurality of shims such that a continuous first flow path and a continuous second flow path are formed through the shims;

wherein the first and second flow paths are substantially parallel to shim thickness;

wherein the term "substantially parallel to shim thickness" means substantially perpendicular to shim width and permits some curvature or minor, or partial deviation from 90° with respect to shim width, and furthermore, a flow path that travels perpendicular ~~parallel~~ to shim thickness over the surface of a shim, through an opening in an adjacent shim, and down to the surface of another shim and again runs perpendicular ~~parallel~~ to shim thickness is not "substantially parallel to shim thickness";

bonding the shims to form a device capable of performing a unit operation on a fluid;

passing a first fluid into the device such that the fluid passes through the first flow path in said plurality of shims; and

performing at least one first unit operation on the fluid as it passes through the first flow path in said plurality of shims;

wherein the first unit operation is selected from the group consisting of distilling, ~~reacting,~~ adsorbing, ~~compressing, expanding,~~ separating, absorbing, ~~vaporizing, condensing,~~ and combinations of these;

passing a second fluid into the device such that the fluid passes through the second flow path in said plurality of shims; and

performing at least one second unit operation on the fluid as it passes through the second flow path in said plurality of shims;

wherein the second unit operation is selected from the group consisting of distilling, reacting, adsorbing, compressing, expanding, separating, absorbing, vaporizing, condensing, and combinations of these; and

wherein the first and second unit operations are different.

28. (previously presented) The process of claim 27 wherein the plurality of shims comprises

at least three shims through which the first flow path is formed and wherein a straight line can be drawn through the flow path in said at least three shims.

29. (currently amended) The process of claim 28 wherein the ~~first~~ second unit operation comprises an exothermic reaction.

30. (previously presented) The process of 29 wherein the second flow path is adjacent to said first flow path and wherein the second unit operation comprises an endothermic reaction.

31. (canceled)

32-63. (canceled).

64-74. (canceled)

75. (previously presented) The process of claim 1 wherein the flow path is formed by an aperture in each of the at least three adjacent shims and wherein the aperture in each of the at least three adjacent shims comprises a shape selected from the group consisting of: waves and irregular shapes.

76. (previously presented) The process of claim 13 wherein the device is capable of performing at least one unit operation selected from the group consisting of: compression, chemical separation, distillation, and condensation.

77. (previously presented) The process of claim 24 wherein the unit operation is selected from the group consisting of: vaporization, compression, chemical separation, distillation, and condensation.

78. (previously presented) The process of claim 1 wherein the flow path is formed by an aperture in each of the at least three adjacent shims and wherein the aperture in each of the at least three adjacent shims comprises rectangles or squares or triangles with rounded corners.

79. (previously presented) The process of claim 7 wherein the mixer comprises a structure comprising a helical pattern, double helical pattern, spiral pattern, or alternating spiral pattern.

80. (previously presented) The process of claim 29 wherein each of the first flow path and the second flow path contain a catalyst and wherein the catalyst in the second flow path is different from the catalyst in said flow path.

81. (previously presented) The process of claim 80 wherein an exothermic reaction is conducted in said flow and an endothermic reaction is conducted in the second flow path.

82. (previously presented) The process of claim 27 wherein the first flow path comprises a metal film.

83. (previously presented) The process of claim 28 wherein the first flow path comprises a metal film on the edge of the flow path.

84. (previously presented) The process of claim 28 wherein the flow path comprises a catalyst metal on an oxide support.

85. (previously presented) The process of claim 13 wherein the plurality of shims comprises at least five shims through which the flow path is formed and a straight, unobstructed line is present through the flow path in said at least five shims; and comprising

passing the fluid into the device such that the fluid passes through the flow path in said at least five shims; and

performing at least one unit operation on the fluid as it passes through the flow path in said at least five shims.

86. (previously presented) The process of claim 7 wherein the flow path in said at least three shims does not connect with any other flow paths.

87. (currently amended) A process of making a device for conducting a unit operation comprising:

stacking a plurality of shims such that a continuous flow path is formed through the shims;

wherein the flow path extends in a direction substantially parallel to shim thickness;

wherein the term "substantially parallel to shim thickness" means substantially perpendicular to shim width and permits some curvature or minor, or partial deviation from 90° with respect to shim width, and furthermore, a flow path that travels perpendicular ~~parallel~~ to shim thickness over the surface of a shim, through an opening in an adjacent shim, and down to the surface of another shim and again runs perpendicular ~~parallel~~ to shim thickness is not "substantially parallel to shim thickness";

wherein the flow path in at least one of the shims further comprises a section in which the flow path extends in a direction substantially perpendicular to shim thickness;

wherein the plurality of shims comprises at least three adjacent shims through which the flow path is formed and wherein a straight, unobstructed line is present through the flow path in said at least three shims;

wherein the flow path in said at least three shims does not mix with any other flow paths;

wherein the three shims are configured such that a unit operation can be performed on a fluid in the flow path in which the straight, unobstructed line is present in said at least three adjacent shims; and

bonding the shims to form the device capable of performing the unit operation on a fluid.

88. (previously presented) The process of claim 87 wherein the flow path in said at least three shims does not connect with any other flow paths.

89. (currently amended) The process of claim 87 wherein the section in which the flow path that extends in a direction substantially perpendicular to shim thickness comprises a header and wherein the header connects to plural flow paths that extend in a direction substantially parallel to shim thickness.

90. (previously presented) The process of claim 87 wherein the section in which the flow path extends in a direction substantially perpendicular to shim thickness comprises a connection to an inlet or outlet.

91. (previously presented) The process of claim 87 wherein the flow path in which the straight, unobstructed line is present comprises a catalyst or sorbent.

92. (previously presented) The process of claim 87 wherein the flow path that is in the section in which the flow path extends in a direction substantially perpendicular to shim thickness also connects to a second section comprising at least three adjacent shims through which the flow path is formed and wherein a straight, unobstructed line is present through the flow path in said at least three shims.

93. (previously presented) The process of claim 87 wherein the plurality of shims comprising at least three adjacent shims through which the flow path is formed comprises at least five adjacent shims through which the flow path is formed and wherein a straight, unobstructed line is present through the flow path in said at least five shims.

94. (previously presented) The process of claim 1 wherein the at least one flow path in said at least three shims does not connect with any other flow paths.

95. (previously presented) The process of claim 1 wherein the borders of apertures in the flow path in said at least 3 shims is at least 50% populated by edge features that cause at least a 1% variation in the diameter of the aperture.

96. (previously presented) The process of claim 14 wherein the flow path in said at least three shims does not connect with any other flow paths.

97. (previously presented) The process of claim 25 wherein the unit operation comprises chemical reaction.

98. (previously presented) The process of claim 5 wherein the second catalyst is placed in the second flow path by wash coating.

99. (previously presented) The process of claim 96 wherein the plurality of shims comprising at least three adjacent shims through which the flow path is formed comprises at least five adjacent shims through which the flow path is formed and wherein a straight, unobstructed line is present through the flow path in said at least five shims.

100. (previously presented) The process of claim 13 wherein the plurality of shims comprising at least three adjacent shims through which the flow path is formed comprises at least five adjacent shims through which the flow path is formed and wherein a straight, unobstructed line is present through the flow path in said at least five shims.

101. (new) The process of claim 10 wherein each parallel row comprises plural, parallel flow paths.